SOME NEW INSTRUMENTS FOR OCEANOGRAPHICAL RESEARCH.

SUPPLEMENTAL NOTE.

In the April, 1917, issue of this REVIEW, p. 159 ffg., appears an interesting contribution on the above subject by Dr. Hans Pettersson. As there stated in footnote 3 on page 162, the author's Table 1 and one illustration had been delayed in the mails. We here print both the missing items.

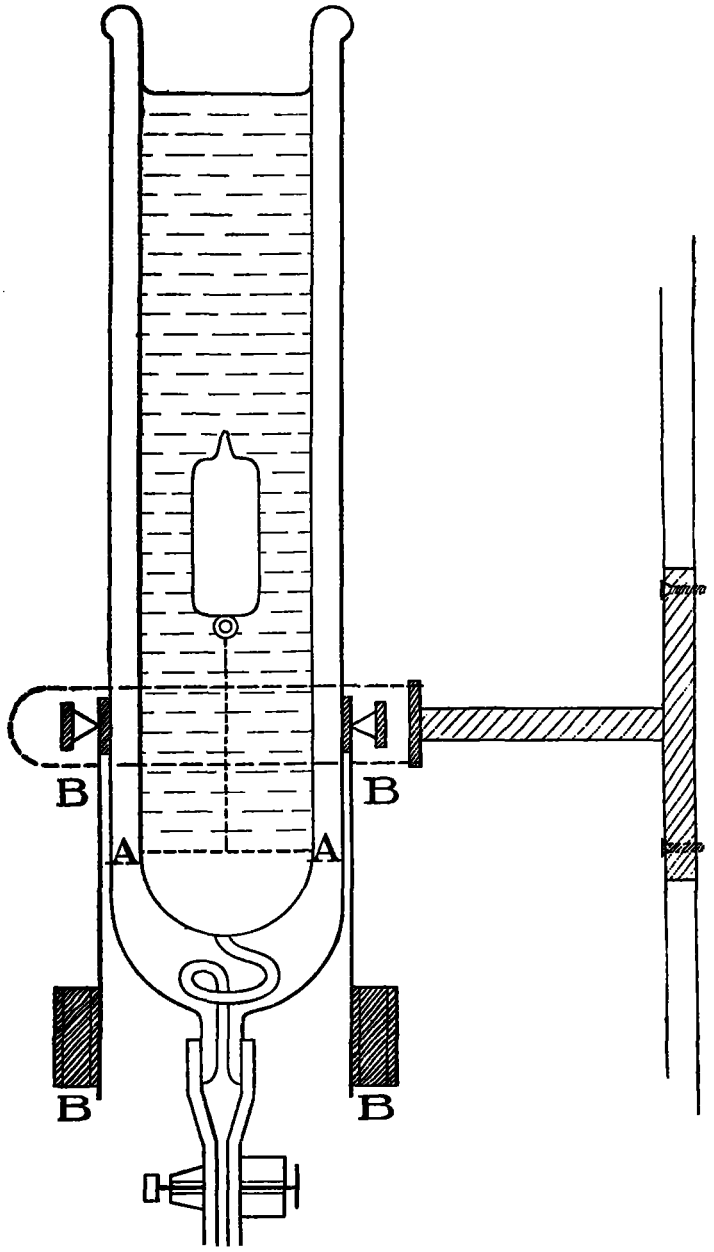

FIG. 5.—H. Pettersson's precision chain-compensated areometer, with gimbal suspension.
BBBB, gimbal mounting with counterpoises.
AA, Dewar flask vessel with float and chain.

The interested reader will recall that on page 162, column 2, Dr. Pettersson mentions a gimbal-mounted precision chain-compensated areometer of about 800 cu. cm. capacity suitable for the accurate daily work on shipboard of an hydrographical expedition. This instrument is here illustrated in figure 5.

TABLE 1.—*Observations with chain-compensated gimbal areometer.*

Depth.	Temperature.	Areometer reading.	Salinity (thousandths).	
			Observed.	Calculated.
meters.	°*C.*			
0	12.35	102	(29.51)	29.51
10	12.25	129.5	30.11	30.08
20	12.00	179.5	31.38	31.32
30	11.70	248	32.77	32.74
40	11.50	278	32.95	32.95
50	11.05	267	(33.06)	33.06
60	11.32	244	33.08	33.06

The work of this instrument is illustrated by Table 1, wherein the salinity (in thousandths), as observed with the instrument, is compared with the computed values.—*Editor.*

551.578.7 (752)

HAIL SQUALL OF MAY 1, 1917, AND ACCOMPANYING WEATHER, BALTIMORE, MD.

By Dr. LEONARD KEENE HIRSHBERG.

[1937 Madison Avenue, Baltimore, Md.]

For 60 hours before the hail squall here discussed there had been a mean, sluggish wind blowing across Baltimore from the east and southeast. Some humans seemed to be unpleasantly affected during those two and a half days. They seemed to be soggy, with uncomfortable chilly sensations and "headachy." As one intelligent gentleman of 40, supposedly in good health, reported, when he went to bed on those two nights the back of his house—turned toward the southeast—had a chill, unpleasant draught through it which seemed to be blowing faster than the 12 to 15 miles an hour indicated on the Weather Bureau anemometer. In his bedroom, at the front (northwest side) of his house, his usual blanket spread with two sheets, seemed too heavy and caused him to sweat like a consumptive. However, when he threw off either the sheets or the blanket he felt chilly and achy. Others also complained of much the same feelings during these two days.

On the afternoon of May 1 the writer went to the roof of a high building situated on a hill in the heart of Baltimore. The sun had shone in some fashion all these 60 hours, albeit not very clearly or brilliantly. As I looked over the city at 1:15 p. m. on this date I suddenly noticed that all the flags flying north of Lombard Street, which runs due east and west, drooped, while the flags flying at points south of that street continued to float pointing due northwest (southeast wind) as they had been doing for the past 60 hours. At the instant I called the attention of my two companions (Jesse Wilcox and W. Harry Noeth) to this phenomenon and as they confirmed the observation the drooping flags to the north floated up again but pointed oppositely to those on the south. Thus Lombard Street marked a dividing line between a northeast wind on its northern side and a southeast wind on its southern side. During the next five minutes the flags on the north slowly swung round into a southeast, some into a south, wind.

As we stood marveling at this odd situation we heard a dull rumble of thunder, the first thunder heard; and not until then did the none too brilliant sun and sky begin to be covered with clouds which came from nowhere else. The clouds seemed to form right before our eyes.

Between 1:25 and 1:30 p. m. there were two flashes of lightning, only one of which was forked and was due west of the city at the horizon; there were also four dull but not distant claps of thunder.

Just at 1:30 by the clock on the Baltimore Sun Building, and after the lightning and thunder had ceased, came a terrific shower with drops [seeming] as large as half-dollar pieces and with hailstones ranging from the size of a pea to small a cherry. The hail fell continuously for 11 minutes, until 1:41 p. m., accompanied by huge raindrops which continued to fall for two minutes after the hail stopped, i. e., until 1:43 p. m. The hailstones had an average diameter of one-fourth to one-half inch and the larger sized stones did not appear until seven minutes after hail began to fall.

After 1:43 p. m. there was a fall of atomized spray for one minute and then the sun came forth to shine more clearly and brilliantly than it had done for a week or 10 days past. All the rest of May 1 the atmosphere was remarkably dry and clear; the wind was a variable northwesterly one of not more than 8 or 10 miles per hour.

551.515 (784)

PHOTOGRAPHS OF THE ANTLER, N. DAK., TORNADO OF AUGUST 20, 1911.

By HOWARD E. SIMPSON, Special Meteorological Observer.

[University, N. Dak., May 9, 1917.]

Tornadoes are very infrequent in North Dakota, but three having been reported to the Weather Bureau since the establishment of its service in this State in 1891. Finley, in his map of tornado frequency, places the State outside of the tornado area. The occurrence of these three and of the well-known Regina tornado far to the northwest in Canada, shows that recent and more complete data would greatly extend the area of known distribution in the Northwest. This does not mean that there is an actual enlargement of the area distribution of tornadoes, or that they are on the increase. It simply means that before the region was settled no tornadoes were reported.

One of the North Dakota tornadoes had the distinction of being international in its course and of having its characteristics recorded in a series of three photographs. The distance traveled by the storm between photographs was about 1½ miles; that by the photographer but a single village block.

The photographs are by Mr. W. H. Wegner, of Antler, N. Dak., to whom the Weather Bureau is indebted not only for the photographs, but for much of the information contained in this report.

The Antler tornado.

About 6:30 p. m Sunday evening, August 20, 1911, a tornado approached the village of Antler, Bottineau County, N. Dak. (lat. 48° 59′ N., long. 101° 16′ W.), from the west. At a point 1½ miles west of the village it turned slightly to the northeast and passed within a short distance of the city limits. It crossed Antler Creek 2 miles north of the village and followed the general course of the creek northeastward across the international boundary line into Canada.

Due north of Antler the storm struck Manning's Grove, on Antler Creek, where a large number of people were picnicking among the trees. In the total destruction of the pavilion, where many had sought refuge, and among the falling trees 22 were injured and 2 killed. Elsewhere two others were killed, and the property loss, chiefly in the form of farm buildings and grain in the field, probably exceeded $100,000.

Since the storm passed so close to town, a number of persons viewed it at close range, yet outside of the danger zone. The photograph shown in figure 1 was taken from the western edge of town, when the storm was 1½ miles to the west. Up to this point the storm was advancing almost due eastward upon the town, but here it veered off to the northeast, passing about 1 mile to the northwest of the photographer. Figure 2 shows the base of the funnel cloud at the point in its path nearest the village. Figure 3 shows the storm 2 miles distant and due north of the town. The photograph was taken just as it struck the grove on Antler Creek, where so many people were injured.

The first photograph of the tornado cloud is undoubtedly one of the best photographs of a tornado funnel ever published (Figs. 1, 4, and 5). The main overhanging storm cloud above a well-defined cloud level and the characteristic pendant funnel are well shown. The flying wisps beneath the cloud cover, the fuzzy margins of the funnel, and the low dust clouds trailing at its heel, all reveal the violent motion of the storm winds. The very local character of the destructive tornado winds is shown in the erect and motionless attitude of the young trees and bushes of the village, though a storm of the most violent type known to man is approaching at a distance of but 1½ miles.

The tornado at this point was not accompanied by the usual thunderstorm, and the clouds stand out distinctly against the light background of the evening sky. The photograph presents, therefore, with remarkable clearness the essential features of a tornado cloud not masked by the usual thunderstorm accompaniment.

The second photograph (fig. 2) was taken looking toward the west-northwest; the storm was nearer, less than a mile distant, and moving diagonally toward the right across the field of vision. A distinct tendency for the funnel to drag like the trail rope of a balloon is evident, and while the front edge is clearly defined the rear is ragged and partly obscured by dust and rain. The trees in the village are practically stationary in the region of calm without the tornado.

The exposure for the third photograph (fig. 3) was made looking due north, just at the moment when the storm was taking its largest toll of life and limb at Manning's Grove, on Antler Creek, 2 miles north of town. The storm is moving diagonally across the field of vision toward the right. On reaching the creek, a few moments before, it is reported to have turned gray in color. The funnel is here seen to be lagging at a still greater angle from the vertical; it has a well-marked heel as well as trailing cloud, and seems to be preceded by rain falling from the front of the upper cloud. It is less compact and shows signs of disintegration. The front of the storm has here reached the international boundary line. The storm path could be traced but a short distance in Canada, and the breaking up in this picture is believed to be the beginning of its dissipation.

Figure 5 is from a double print combining an enlargement of the first photograph (fig. 4) of the tornado cloud with a later photograph of the identical foreground under light conditions more favorable for the bringing out of detail. In this double print neither negative has been retouched. The double print was made to satisfy local and popular interest.